FACT SHEET FOR STATE RECLAIMED WATER PERMIT ST-7445

King County South Treatment Plant – Water Reclamation Facility

SUMMARY

King County's South Plant treats wastewater to secondary treatment standards using an activated sludge process. The majority of the treated effluent is discharged via a deep water outfall to Puget Sound which is authorized under NPDES permit number WA-002958-1. A portion of the treated effluent is pumped to an on-site water reclamation facility for reclaimed water treatment. The water reclamation facility produces a Class A reclaimed water through a process that includes coagulation, filtration and disinfection. The South Plant uses the reclaimed water on-site for process water needs and for landscape irrigation. In addition, they act as a water supplier to distribute water off-site for irrigation, commercial and industrial uses.

This State Reclaimed Water Permit and associated fact sheet specifically authorize the South Plant to distribute Class A reclaimed water from the existing water reclamation facility to off-site users. The permit will require modification if King County would like to distribute other classes of water (Class B, C, or D) or would like to install additional treatment facilities.

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INTRODUCTION

This fact sheet is a companion document to the draft State Reclaimed Water Permit No.ST-7445. The Department of Ecology (the Department) is proposing to issue this permit, which will allow the beneficial use of reclaimed water. This fact sheet explains the nature of the proposed reclamation and reuse treatment, distribution and use, the Department's decisions on limiting the pollutants in the reclaimed water, and the regulatory and technical bases for those decisions.

The Reclaimed Water Act, Chapter 90.46 RCW, authorized the development of Water Reclamation and Reuse Standards for the beneficial use of reclaimed water. These standards were completed in 1997. The foundation for reclaimed water policies begins with the Washington State legislature, which expressly encourages the development and use of reclaimed water through Washington's Reclaimed Water Act (chapter 90.46 RCW), which states:

> "It is hereby declared that the people of the state of Washington have a primary interest in the development of facilities to provide reclaimed water to replace potable water in non-potable applications, to supplement existing surface and ground water supplies, and to assist in meeting the future water requirements of the state. The legislature further finds and declares that the utilization of reclaimed water by local communities for domestic, agricultural, industrial, recreational, and fish and wildlife habitat creation and enhancement purposes, including wetland enhancement, will contribute to the peace, health, safety, and welfare of the people of the state of Washington. To the extent reclaimed water is appropriate for beneficial uses, it should be so used to preserve potable water for drinking purposes. Use of reclaimed water constitutes the development of new basic water supplies needed for future generations. The legislature further finds and declares that the use of reclaimed water is not inconsistent with the policy of anti-degradation of state waters announced in other state statutes, including the Water Pollution Control Act chapter 90.48 RCW and the water resources act, chapter 90.54 RCW."

All reclaimed water permits issued by the Department of Ecology must specify conditions demonstrating that the wastewater has been adequately and reliably treated to meet the requirements in the Water Reclamation and Reuse Standards appropriate for the use. In addition to meeting the water quality limitations, the standards require specific treatment and disinfection requirements beyond those of most conventional wastewater treatment facilities. The standards also require automated alarms, redundancy of treatment units, emergency storage, stringent operator training requirements and public notification of reclaimed water use.

Under the Reclaimed Water Act, a permit is issued to the generator of the reclaimed water who may then distribute the water subject to the permitted provisions governing the location, rate, water quality and purposes of use. RCW 90.46.040 states that a permit is required for land application of reclaimed water. The permit is issued by Ecology under the authority of Chapter 90.48 RCW which requires that a permit be issued before any discharge of pollutants to waters of the state is allowed (RCW 90.48.080 and 90.48.162). RCW 90.46.030 states that the Department of Health may issue a permit for industrial and commercial uses of reclaimed water and that the permits will govern the location, rate, water quality and purposes of use. Per

memorandum of agreement between the Department of Ecology and the Department of Health, DOH requirements are included in a single permit issued by Ecology.

In addition to the Water Reclamation and Reuse Standards, regulations adopted by the State include procedures for issuing permits (Chapter 173-216 WAC), technical criteria for discharges from municipal wastewater treatment facilities (Chapter 173-221 WAC) and water quality criteria for ground waters (Chapter 173-200 WAC). The Reclaimed Water Act, the Water Reclamation and Reuse Standards and these regulations establish the basis for effluent limitations and other requirements which are included in the permit.

This fact sheet and draft permit are available for review by interested persons as described in Appendix A--Public Involvement Information.

The fact sheet and draft permit have been reviewed by the Washington State Department of Health and by the Permittee. Errors and omissions identified in these reviews have been corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. Changes to the permit will be addressed in Appendix D--Response to Comments

GENERAL INFORMATION	
Applicant	King County Department of Natural Resources Wastewater Treatment Division 201 S. Jackson Street Seattle, WA 98104-3855
Facility Name and Address	King County – South Treatment Plant Reclaimed Water Facility 1200 Monster Road SW Renton, WA 98055
Type of Treatment System:	Source water is treated with secondary treatment using activated sludge. The tertiary treatment includes coagulation, filtration and disinfection.
Description of Use Area(s)	Vicinity of the South Treatment Plant.
Contact at Facility	Name: Process Control Supervisor Telephone #: (206) 684-2400
Responsible Official	Name: Mike Fischer Title: South Plant Manager Address: 1200 Monster Road SW Telephone #: (206) 684-2400 FAX #

BACKGROUND INFORMATION

DESCRIPTION OF THE COLLECTION AND TREATMENT SYSTEM

HISTORY

The King County Department of Natural Resources, Wastewater Treatment Division operates two major wastewater treatment plants in King County. The South Plant services south King County and the area of King County east of Lake Washington. The latest plant expansion, completed in the year 2000, has provided the plant with a design capacity to treat 144 million gallons per day (MGD, maximum month) of wastewater. The plant is permitted to discharge the processed secondary treated effluent to Puget Sound via a deep water outfall under NPDES permit number WA-002958-1.

In 1995, King County proposed and began planning for the installation of a water reclamation facility to be located at the South Plant. The purpose of the water reclamation facility was to generate reclaimed water that could provide an alternative to using potable water. The scope of the project, as described in the *Engineering Report*[1], was to construct a relatively simple and low cost facility to demonstrate that secondary treated effluent could be safely, reliable and economically treated to meet the *Water Reclamation and Reuse Standards*[2]. The Engineering Report for the Reclamation Plant identified potential uses of the reclaimed water produced at the South Plant and other potential users in the vicinity of the South Plant.

Construction of the reclamation facility was completed in the year 1997. Since that time, the facility has produced Class A reuse water year around for use at the South Plant to replace some of the potable water used in the wastewater treatment process. In addition, the Reclamation Plant serves irrigation users outside of the South Plant during the months from approximately April through November.

COLLECTION SYSTEM STATUS

The South Treatment Plant serves an area of 152 square miles. King County owns and operates the major sewer interceptors and pump stations that carry the wastewater to the South Plant. Many component agencies individually own, operate and maintain the pipelines and other conveyance facilities that carry wastewater to the King County's interceptors. Wastewater is conveyed to the South Plant via three interceptors, the Tukwila Interceptor, the South Interceptor and the Eastside Interceptor. There are 26 pump stations in the system. The operation of the collection system is monitored and controlled using a SCADA (Supervisory Control and Data Acquisition) system located at the South Plant.

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[1] Brown and Caldwell, King County Department of Metropolitan Services, Engineering Report, Effluent Reuse Pilot Project, May, 1995.
[2] Washington State Department of Ecology, Washington State Department of Health, Water Reclamation and Reuse Standards, Publication, #97-23, September, 1997.

TREATMENT PROCESSES

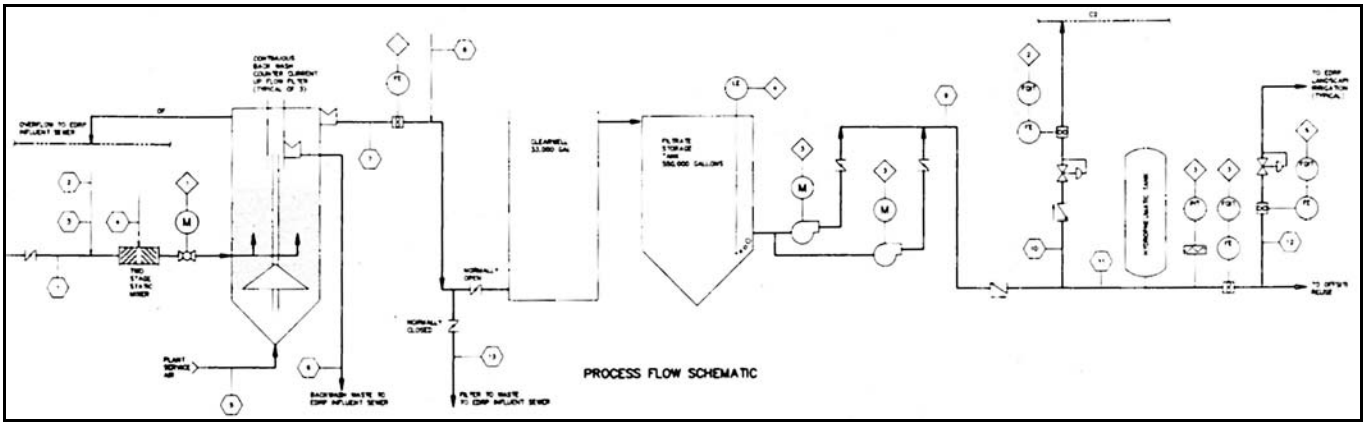

FIGURE 1. SIMPLIFIED PROCESS FLOW DIAGRAM, RECLAMATION PLANT

The simplified process flow diagram is as shown above in figure 1. The source water for the Reclamation Plant is chlorinated secondary treated effluent that contains 30 mg/L or less TSS and BOD (based on a monthly average). It is pumped directly from the chlorine contact channel to the Reclamation Plant for treatment. The first step in the reclamation process is the addition of coagulants to aid in the removal of suspended solids to reduce the turbidity of the water. The coagulant addition, which may include the addition of alum, polymer, polyaluminum chloride (PAC) and/or aluminum chlorohydrate (ACH), is monitored and amounts are varied in order to meet the regulatory turbidity limits of less than 2 nephelometric turbidity units (NTU) for a monthly average and not to exceed 5 NTU's at any one time. The coagulant(s) are mixed into the feed water using a static mixer located upstream of the sand filters.

Filtration is the core unit process that differentiates Class A reclaimed water from other classes of reclaimed water. The facility uses Dynasand® continuous backwash counter current up-flow sand filters for the filtration step. One to three filters can be used in parallel depending on the demand for reclaimed water. Hypochlorite is injected into the filtered effluent (refer to as the filtrate) at a dosing rate from 5 – 10 mg/L as Cl_2. The filtered water flows through a series of chlorine contact tanks designed to provide a minimum of 30 minutes detention time at the design maximum flowrate. The final tertiary treated effluent from the plant flows into a 550,000 gallon storage tank. Historically, 2-3 hours of contact is provided in the contact tanks, with the storage tank providing as much as 1-2 days additional contact.

An arrangement of four distribution pumps allows the reuse water to be pumped at varying rates up to 3600 gallons per minute (gpm). Reuse water is distributed to the South Plant for use in the wastewater treatment process, to the South Plant landscape irrigation system and for off-site use.

The Reclamation Plant meets the treatment, disinfection, redundancy and other requirements of the Water Reclamation and Reuse Standards through the following design and operation protocols.

- Filtrate (prior to disinfection) is automatically diverted to the STP influent in the event of high turbidity from the filters , or loss of NaOCl or coagulant.
- A standby source of potable water is provided as a back up to reclaimed water with the necessary air gap protection to prevent contamination of the potable water source.
- The water reclamation operational controls include the automatic shutdown of the source water feed pumps to the Reclamation Plant if normal power supplies are interrupted. This will prevent untreated secondary effluent from entering the reclaimed water distribution system.
- Chlorinated filtrate is automatically diverted to the STP influent in the event of a low chlorine residual at the outlet of the Chlorine contact tanks.
- All of the biological treatment steps at the South Plant meet the Department of Ecology's requirements for Class 1 reliability.
- The coagulation control systems include adequate storage and flow control.
- The disinfection system includes a complete standby metering pump for Sodium Hypochorite supply to the Reclamation Plant. Continuous on-line analyzers and recorders for measurement of residual chlorine are provided at several locations including the inlet and outlet of the chlorine contact tanks, and at the exit from the reclaimed water storage tank.

King County has a delegated Pretreatment Program. The South Treatment Plant's application for NPDES permit renewal lists a total of approximately 80 industrial user discharges received by the South Plant. There are 34 Significant Industrial Users (SIUs) and 46 Categorical Industrial Users (CIUs).

At the writing of this permit, the South Plant had a budgeted staff level of 136 full-time employees (FTEs). The plant is staffed 24 hours per day with 12-hour shifts. All critical plant operations are monitored and/or controlled from a central control room using a supervisory control and data acquisition (SCADA) system.

DISTRIBUTION SYSTEM AND USE AREA

The reclaimed water distribution system includes on-site distribution for process and irrigation purposes and off-site distribution. This permit covers off-site use only. A permit is not required for on-site use normally associated with wastewater treatment practices. The off-site distribution system is composed of a purple pipe underground system to off-sites use points. Appendix C, Table 1: Reclaimed Water Off-Site Use Summary, 2003, lists all the users of reclaimed water in the year 2003. This list will be updated annually by King County and provided to the Department as specified in the Reclaimed Water Permit.

For all these uses, appropriate flow rates, setbacks, signs, and other controls will be in place for the use of class A reclaimed water per the *Water Reclamation and Reuse Standards*.

RESIDUAL SOLIDS

The backwash water contains the solids that have been removed in the process of reclaiming water. The filter backwash is returned to the influent flow to the South Plant. The wastewater

treatment process remove solids at the headworks (grit and screenings), and at the primary and secondary clarifiers, in addition to incidental solids (rags, scum, and other debris) removed as part of the routine maintenance of the equipment. Grit, rags, scum and screenings are drained and disposed of as solid waste at a landfill. Primary and waste secondary sludge are co-thickened in the Dissolved Air Floatation Tanks. The thickened sludge is fed to the anaerobic mesophilic digesters. The digested sludge is combined in a common blending storage tank and then dewatered with belt filter presses to produce biosolids. The biosolids are applied to forest and agriculture lands under a permit from the King County Health Department.

The biosolids are periodically analyzed for various chemical contaminants. Regulatory and compliance issues regarding biosolids are managed by the Department of Ecology's Biosolids Program.

GROUND WATER

All irrigation is to done at agronomic rates to prevent impacts to the groundwater and nearby surface water.

PERMIT STATUS

The previous permit for this facility was issued on July 15, 1997 as part of the NPDES permit for King County's South Treatment Plant.

An application for permit renewal of the NPDES permit was submitted to the Department on December 31, 2001 and accepted by the Department on June 25, 2002 for the NPDES permit.

This new State Reclaimed Water Permit was issued for the Reclamation Plant to separate the permitting of reclaimed water from the permitted of the wastewater discharge (the NPDES permit). This was done to provide added flexibility to King County for the management of their reclaimed water program.

SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

The facility last received an inspection on June 24, 2003. No violations or compliance related issues were found.

During the history of the previous permit, the Permittee has numerous violations based on Discharge Monitoring Reports (DMRs) that were submitted for the Reclamation Plant. These violations are summarized in Appendix C, Table 2: DMR Data. The facility had numerous total coliform exceedances over the last 6 years. The facility has made process changes to address the issue of high total coliform.

RECLAIMED WATER CHARACTERIZATION

The concentration of pollutants in the reclaimed water was reported in the monthly Discharge Monitoring Report. The reclaimed water prior to distribution for use was analyzed for the following parameters:

TABLE A: SUMMARY OF DMR DATA (AUGUST, 1997 – DECEMBER, 2003)

Analysis		Units	Permit Limit	Maximum Daily	Minimum	Average
COLIFORM, TOTAL	Median	#/100 ML	**2.2**	**37.0**	0.0	1.8
COLIFORM, TOTAL	MAX	#/100 ML	**23**	**404.0**	1.0	29.8
FLOW	AVG	GPD	**NA**	77180.0	0.0	35495.4
FLOW	MAX	GPD	**NA**	457059.0	0.0	81795.2
NITRATE (AS N)	MAX	MG/L	**NA**	2.6	0.0	0.4
PH	MAX	S.U.	**9**	7.9	6.6	7.2
PH	MIN	S.U.	**6**	7.0	5.8	6.5
TURBIDITY	AVM	NTU	**2**	2.0	0.3	1.4
TURBIDITY	MAX	NTU	**5**	3.0	0.5	2.4

WATER RIGHTS STATUS

The Permittee is considered the generator of the reclaimed water and RCW 90.46.120 gives the Permittee exclusive right to any water generated by the wastewater treatment facility. Use and distribution of reclaimed water is exempted from the water right permit requirements of RCW 90.03.250 and 90.44.060.

PROPOSED PERMIT LIMITATIONS

The Reclaimed Water Act, Chapter 90.46 RCW requires that reclaimed water be adequately and reliably treated prior to distribution and beneficial use. State regulations require that limitations set forth in a permit issued under Chapter 90.46 and 90.48 RCW must be either technology- or water quality-based. Municipal wastewater must also be treated using all known, available, and reasonable treatment (AKART) and not pollute the waters of the State. The minimum criteria to demonstrate compliance with these requirements is derived from the *Water Reclamation and Reuse Standards* and Chapter 173-221 WAC.

The more stringent of the water quality-based or technology-based limits are applied to each of the parameters of concern. Each of these types of limits is described in more detail below.

TECHNOLOGY-BASED EFFLUENT LIMITATIONS

All reclaimed water permits must assure that the effluent has been adequately and reliably treated so that as a result of that treatment, it is suitable for a beneficial use or controlled use that would not otherwise occur and is no longer considered a wastewater [(RCW 90.46.010(40)].

The authority and duties for reclaimed water use are in addition to those already provided in law with regard to sewage and wastewater collection, treatment and disposal for the protection of public health and the safety of the state's waters. All waste discharge permits issued by the Department must specify conditions requiring all known available and reasonable methods of prevention, control, and treatment of discharges to waters of the state (WAC 173-216-110). For land application, the permit requires the reclaimed water to be applied at agronomic rates.

The Water Reclamation and Reuse Standards, 1997, outline the requirements for the additional level of treatment technology as well as water quality limits necessary for public health

protection during the use of reclaimed water. The standards provide four classes of reclaimed water, Classes A, B, C and D.

This facility produces Class A reclaimed water. Class A is the highest quality of reclaimed water and therefore provides the broadest range of reuse opportunities. Conversely, Class A reclaimed water requires the most stringent treatment and water quality limitations. The technology and water quality requirements for the production of Class A reclaimed water are as follows:

"Class A Reclaimed Water" is reclaimed water that had been adequately and reliably treated and, at a minimum is, at all times, an oxidized, coagulated, filtered and disinfected wastewater.

1. Oxidized is defined as wastewater in which the organic matter has been stabilized such that the biochemical oxygen demand (BOD_5) does not exceed 30 mg/L and total suspended solids (TSS) does not exceed 30 mg/L, is nonputrescible and contains dissolved oxygen.
2. Coagulated wastewater is defined as an oxidized wastewater in which colloidal and finely divided suspended matter have been destabilized and agglomerated prior to filtration by the addition of chemicals or by an equally effective method.
3. Filtered wastewater is defined as an oxidized, coagulated wastewater which has been passed through natural undisturbed soils or filter media, such as sand or anthracite, so that the turbidity as determined by an approved laboratory method does not exceed an average operating turbidity of 2 nephelometric turbidity units (NTU), determined monthly, and does not exceed 5 NTU at any time.
4. Adequate disinfection is defined as the median number of total coliform organisms in the wastewater after disinfection does not exceed 2.2 per 100 milliliters, as determined from the bacteriological results of the last seven (7) days for which analyses have been completed, and the number of total coliform organisms does not exceed 23 per 100 milliliters in any sample.
5. A 0.5 mg/L chlorine residual shall be maintained in the reclaimed water during conveyance from the reclamation facility to the use areas unless a waiver is granted by the Departments of Ecology and Health.

COMPARISON OF LIMITATIONS WITH THE EXISTING PERMIT ISSUED JULY 15, 1997

TABLE B: COMPARISON OF PREVIOUS AND NEW LIMITS

Parameter		Units	Existing Permit Limit	Proposed Permit Limits
BOD_5 [a]	AVM, monthly avg.	mg/L	None	**30**
BOD_5 [a]	MAX, sample max.	mg/L	None	**45**
TSS [a]	AVM, monthly avg.	mg/L	None	**30**
TSS [a]	MAX, sample max.	mg/L	None	**45**
Turbidity	AVM, monthly avg.	NTU	2	2
Turbidity	MAX, sample max.	NTU	5	5
Total Coliform Bacteria	AVW, 7-day moving median	#/100 ML	2.2	2.2
Total Coliform Bacteria	MAX, sample max.	#/100 ML	23	23
pH	MAX	S.U.	9	9

Parameter		Units	Existing Permit Limit	Proposed Permit Limits
pH	MIN	S.U.	6	6
Chlorine	DAILY MIN.	mg/L	None	**0.5**

[a] Data as reported on the NPDES permit may be used to demonstrate compliance with these limits.

MONITORING REQUIREMENTS

Monitoring, recording, and reporting are specified to verify that the treatment process is functioning correctly, and that reclaimed water limitations are being achieved.

INFLUENT AND EFFLUENT MONITORING

The monitoring and testing schedule is detailed in the proposed permit under Condition R2. Specified monitoring frequencies take into account the quantity and variability of the reclaimed water, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

OTHER PERMIT CONDITIONS

REPORTING AND RECORDKEEPING

The conditions of R3. are based on the authority to specify appropriate reporting and recordkeeping requirements to prevent and control the distribution or use of inadequately treated wastewater.

FACILITY LOADING

The design criteria for the Reclamation Plant are taken from the *Engineering Report, Effluent Reuse Pilot Project* dated May, 1995 prepared by Brown and Caldwell and are as follows[3]:

TABLE C: DESIGN CRITERIA

Firm Capacity of Reclaimed Water (Feed to filters):	1.3 MGD
Maximum Unit Filtration Rate:	320 gpm/filter
Maximum Feed Suspended Solids Concentration (Secondary Effluent):	50 mg/L
Design Filter Effluent Turbidity:	1.5 NTU

OPERATIONS AND MAINTENANCE

The proposed permit contains condition R.5. as authorized under RCW 90.48.110, WAC 173-220-150, Chapter 173-230 WAC, and WAC 173-240-080. It is included to ensure proper operation and regular maintenance of equipment, and to ensure that adequate safeguards are taken so that constructed facilities are used to their optimum potential in terms of pollutant capture and treatment.

[3] The stated design numbers were verbally confirmed by Curtis Steinke, Process Analyst, on June 14, 2004.

RESIDUAL SOLIDS HANDLING

To prevent water pollution the Permittee is required in the NPDES permit to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of RCW 90.48.080 and State Water Quality Standards.

The final use and disposal of biosolids from this facility is regulated by U.S. EPA under 40 CFR 503. The disposal of other solid waste is under the jurisdiction of the local health district.

PRETREATMENT

The Water Reclamation and Reuse Standards require the generator of the reclaimed water to either have a Department delegated industrial wastewater treatment program or all industries discharging into the generator's wastewater collection system shall have current waste discharge permits issued by Ecology. WAC 173-216-110 requires that the list of prohibitions in WAC 173-216-060 be included in the permit. King Count has a delegated pretreatment program.

Federal pretreatment requirements in 40 CFR 403 and Sections 307(b) and 308 of the Clean Water Act apply to this facility. Therefore notification to the Department is required when pretreatment prohibitions are violated and when new sources of commercial or industrial wastewater discharge are added to its system.

RECLAIMED WATER USE

These permit requirements are based on the Water Reclamation and Reuse Standards authorized in Chapter 90.46 RCW. The standards contain requirements to assure that distribution and use of reclaimed water are protective of public health and the environment at all times. These include prohibitions on bypass, alarms and storage or alternative disposal of substandard water, maintenance of operational records, cross connection control, use area restrictions and enforceable contracts and a local reclaimed water use ordinance.

GENERAL CONDITIONS

General Conditions are based directly on state laws and regulations and have been standardized for all municipal waste discharge to ground water permits issued by the Department.

G1 requires responsible officials or their designated representatives to sign submittals to the Department.

G2 requires the Permittee to allow the Department to access the treatment system, production facility, and records related to the permit. Condition G3 specifies conditions for modifying, suspending or terminating the permit.

G4 requires the Permittee to apply to the Department prior to increasing or varying the discharge from the levels stated in the permit application.

G5 requires the Permittee to construct, modify, and operate the permitted facility in accordance with approved engineering documents.

G6 prohibits the Permittee from using the permit as a basis for violating any laws, statutes or regulations.

G7 requires application for permit renewal 180 days prior to the expiration of the permit.

G8 describes transfer of the permit.

G9 requires compliance for situations like power failure.

G10 deals with removed substances.
G11 deals with providing information.
G12 and G13 describe other requirements and additional monitoring.
G14 requires the payment of permit fees.
G15 describes the penalties for violating permit conditions.
G16 deals with property rights and G17 describes the Permittee's duty to comply.
G18 deals with toxic pollutants.
G19 lists penalties for tampering.
G20 deals with reporting planned changes.
G21 describes reporting for non-compliance.
G22 deals with reporting and G23 describes compliance schedule reporting.

RECOMMENDATION FOR PERMIT ISSUANCE

This proposed permit meets all statutory requirements for authorizing the beneficial use of reclaimed water, including those limitations and conditions believed necessary to control toxics, and to protect human health and the beneficial uses of waters of the State of Washington. The Department proposes that the permit be issued for five years.

REFERENCES FOR TEXT AND APPENDICES

Washington State Department of Ecology, 1993. Guidelines for Preparation of Engineering Reports for Industrial Wastewater Land Application Systems, Ecology Publication # 93-36. 20 pp.

Washington State Department of Ecology and Department of Health, 1997. Water Reclamation and Reuse Standards, Ecology Publication # 97-23. 73 pp.

Washington State Department of Ecology 1998. Chapter E-1, Criteria For Sewage Works Design, Ecology Publication # 98-37. 50 pp

Washington State Department of Ecology, 1996. Implementation Guidance for the Ground Water Quality Standards, Ecology Publication # 96-02.

Washington State Department of Health, 1994. Design Criteria for Municipal Wastewater Land Treatment, 10 pp

APPENDICES

APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to issue a permit to the applicant listed on page one of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public notice of application was published on September 3, 2002 and September 10, 2002 in *Seattle Times* to inform the public that an application had been submitted and to invite comment on the issuance of this permit.

The Department will publish a Public Notice of Draft (PNOD) on August 26, 2004 in *Seattle Times and Seattle Post Intelligencer* to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Water Quality Permit Coordinator
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the thirty (30) day comment period to the address above. The request for a hearing shall indicate the interest of the party and reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-216-100). Public notice regarding any hearing will be circulated at least thirty (30) days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing.

Comments should reference specific text followed by proposed modification or concern when possible. Comments may address technical issues, accuracy and completeness of information, the scope of the facility's proposed coverage, adequacy of environmental protection, permit conditions, or any other concern that would result from issuance of this permit.

The Department will consider all comments received within thirty (30) days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, 425-649-7201, or by writing to the address listed above.

This fact sheet and permit were written by Karen Burgess.

APPENDIX B--GLOSSARY

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.

Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Average Monthly Discharge Limitation--The average of the measured values obtained over a calendar month's time.

Beneficial Use – The use of reclaimed water that has been transported from the point of production to the point of use without an intervening discharge to the waters of the state, for a beneficial purpose.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass--The intentional diversion of waste streams from any portion of the collection or treatment facility.

Chlorine--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Compliance Inspection - Without Sampling--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance Inspection - With Sampling--A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Additional sampling may be conducted.

Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots.

Construction Activity--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

Continuous Monitoring –Uninterrupted, unless otherwise noted in the permit.

Distribution Uniformity--The uniformity of infiltration (or application in the case of sprinkle or trickle irrigation) throughout the field expressed as a percent relating to the average depth infiltrated in the lowest one-quarter of the area to the average depth of water infiltrated.

Engineering Report--A document, signed by a professional licensed engineer, which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Groundwater Recharge Criteria – The contaminant criteria found in the drinking water quality standards adopted by the state board of health pursuant to chapter 43.20 RCW and the department of health pursuant to chapter 70.119A RCW.

Grab Sample--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

Industrial Wastewater--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Maximum Daily Discharge Limitation--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Method Detection Level (MDL)--The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is above zero and is determined from analysis of a sample in a given matrix containing the analyte.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Quantitation Level (QL)-- A calculated value five times the MDL (method detection level).

Reclaimed Water – Effluent derived in any part from sewage from a wastewater treatment system that has been adequately and reliably treated, so that as a result of that treatment, it is suitable for a beneficial use or a controlled use that would not otherwise occur and is no longer considered wastewater.

Sample Maximum -- No sample shall exceed this value.

Soil Scientist--An individual who is registered as a Certified or Registered Professional Soil Scientist or as a Certified Professional Soil Specialist by the American Registry of Certified Professionals in Agronomy, Crops, and Soils or by the National Society of Consulting Scientists or who has the credentials for membership. Minimum requirements for eligibility are: possession of a baccalaureate, masters, or doctorate degree from a U.S. or Canadian institution with a minimum of 30 semester hours or 45 quarter hours professional core courses in agronomy, crops or soils, and have 5,3,or 1 years, respectively, of professional experience working in the area of agronomy, crops, or soils.

Surface Percolation – The controlled application of water to the ground surface for the purpose of replenishing ground water.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Coliform Bacteria—Coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. A microbiological test is used to detect and enumerate the total coliform group of bacteria in water samples.

Total Dissolved Solids--That portion of total solids in water or wastewater that passes through a specific filter.

Total Suspended Solids (TSS)--Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Water Quality-based Effluent Limit--A limit on the concentration of an effluent parameter that is intended to prevent pollution of the receiving water.

APPENDIX C--TECHNICAL CALCULATIONS

TABLE 1: RECLAIMED WATER OFF- SITE USE SUMMARY, 2003

Refer to attached appendices.

TABLE 2: DMR DATA

Refer to attached appendices.

APPENDIX D--RESPONSE TO COMMENTS

Comment 1:
Comments submitted by Tom Fox, King County

Comments on
FACT SHEET FOR STATE RECLAIMED WATER PERMIT ST-7445
King County South Treatment Plant – Water Reclamation Facility

Page 7 Treatment Process first and second paragraphs should read:

FIGURE 1. SIMPLIFIED PROCESS FLOW DIAGRAM, RECLAMATION PLANT
The simplified process flow diagram is as shown above in figure 1. The source water for the Reclamation Plant is chlorinated secondary treated effluent that contains 30 mg/L or less TSS and BOD (based on a monthly average). It is pumped directly from the chlorine contact channel to the Reclamation Plant for ~~tertiary~~ treatment. The first step in the reclamation process is the addition of coagulants to aid in the removal of suspended solids to reduce the turbidity of the water. The coagulant addition, which may include the addition of alum, polymer, polyaluminum chloride (PAC) and/or aluminum chlorohydrate (ACH), is monitored and amounts are varied in order to meet the regulatory turbidity limits of less than 2 nephelometric turbidity units (NTU) for a monthly average and not to exceed 5 NTU's at any one time. The coagulant(s) are mixed into the feed water using a static mixer located upstream of the sand filters.

Filtration is the core unit process that differentiates Class A reclaimed water from other classes of reclaimed water. The facility uses Dynasand® continuous backwash counter current up-flow sand filters for the filtration step. One to three filters can be used in parallel depending on the demand for reclaimed water. Hypochlorite is injected into the filtered effluent (refer to as the filtrate) at a dosing rate from 5 – 10 mg/L as Cl_2. The filtered water flows through a series of chlorine contact tanks designed to provide a minimum of 30 minutes detention time at the design maximum flowrate. The final tertiary treated effluent from the plant flows into a 550,000 gallon storage tank. Historically, 2-3 hours of contact is provided in the contact tanks, with the storage tank providing as much as 1-2 days additional contact.

- Filtrate (prior to disinfection) is automatically diverted to the STP influent in the event of high turbidity from the filters , or loss of NaOCl or coagulant.
- A standby source of potable water is provided as a back up to reclaimed water with the necessary air gap protection to prevent contamination of the potable water source.
- The water reclamation operational controls include the automatic shutdown of the source water feed pumps to the Reclamation Plant if normal power supplies are interrupted. This will prevent untreated secondary effluent from entering the reclaimed water distribution system.
- Chlorinated filtrate is automatically diverted to the STP influent in the event of a low chlorine residual at the outlet of the Chlorine contact tanks.

- All of the biological treatment steps at the South Plant meet the Department of Ecology's requirements for Class 1 reliability.
- The coagulation control systems include adequate storage and flow control.
- The disinfection system includes a complete standby metering pump for Sodium Hypochorite supply to the Reclamation Plant. Continuous on-line analyzers and recorders for measurement of residual chlorine are provided at several locations including the inlet and outlet of the chlorine contact tanks, and at the exit from the reclaimed water storage tank.

Table A on Page 9 should refer to "Nitrate (as N)"

Table B on Page 11 Total Coliform should be "7 Day Moving Median"

Ecology Response 1:

Ecology concurs with the requested factual corrections. The changes to the fact sheet have been made as requested.